Results on main elasmobranch species captured in the bottom trawl surveys on the Northern Spanish Shelf

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Abstract

This working document presents the results on some significant elasmobranch fish species in the Spanish Groundfish Survey on Northern Spanish shelf in 2010. The main species in biomass terms in this survey are Scyliorhinus canicula, Galeus spp., Etmopterus spinax, Raja clavata, Raja montagui and Leucoraja naevus in decreasing abundance order. Biomass, distribution and length ranges were analysed. Galeus spp. and E. spinax occupied deeper areas than S. canicula and R. montagui was not distributed as deep as the other two rays.

Introduction

The bottom trawl survey on the Northern Spanish Shelf aim to provide data and information for the assessment of the commercial fish species and the ecosystems on the Galician and Cantabrian shelf (ICES divisions VIIIc and IXa North). The Spanish bottom trawl survey on the northern Spanish shelf has been carried out every autumn since 1974, although a standardized methodology was adopted from 1983 (ICES, 2010a, 2010b).

The aim of this working document is to report the results (abundance indices, length frequency distributions and geographic and bathymetric distributions) on the most common elasmobranch fish species in 2010 survey after the results presented in Velasco *et al.* (2010). The species analysed in the present working document are: *Scyliorhinus canicula* (spotted dogfish), *Galeus spp*., *Etmopterus spinax* (velvet belly), *Raja clavata* (thornback ray), *Raja montagui* (spotted ray) and *Leucoraja naevus* (cuckoo ray).

Material and methods

The survey was carried out on board the R/V "Cornide de Saavedra", between Sep. 16th and the 18th of October of 2010.

The standard IBTS methodology for the western and southern areas (ICES, 2010b) has been applied. The sampling design used was random stratified with five geographical sectors (Figure 1: MF. Miño-Finisterre, FE. Finisterre-Estaca de Bares, EP. Estaca de Bares - Peñas, PA. Peñas-Ajo, AB. Ajo-Bidasoa). The depth stratification was changed

in 1997 from 30-100 m, 101-200 m, 200-500 m to 70-120 m, 121-200 m and 201-500 to overcome the shortage of grounds shallower than 70 m that hindered the representativeness of the coverage of this stratum. Hauls shallower than 70 m and deeper than 500 m are considered additional hauls and performed every year if possible, thought they are not included in the stratified abundance indices, nevertheless they are performed and plotted in the distribution maps. The information from these depths is considered relevant due to the changes in the depth of fishing activities in the area (Punzón et al. 2011a). To determine the depth range of these species additional hauls have also been considered.

Results

Standard sampling carried out (Figure 1) had 114 standard hauls, and 14 additional hauls, 2 shallower than 70 m, and 12 deeper than 500 m. Mean total catch per haul was 203.2 ±23.59 kg. Fishes represented about 79% of the total catch while elasmobranchs made up ca. 7% of the total fish catch.

Scyliorhinus canicula (Lesser spotted dogfish)

This species represented about 61% of the total elasmobranchs stratified biomass caught, and in 2010 it was found in just one additional shallower haul. It showed a depth range from 33 to 594 m in the overall time series.

The differences in biomass terms between the IXa and VIIIc divisions from 2006 to 2010 were lower than in the previous period due to the marked increase in the former division (Figure 2, Figure 3). In 2010, the IXa division showed high biomass in contrast with the decreasing trend in the previous four years, also a slight decrease is showed in the VIIIc division. The percentage of *S. canicula* biomass in the total fish biomass catch rate ranged from 1.7% (2.15 Kg haul^{-1}) in 1983 to 4.3% in 2010 (7.02 Kg haul^{-1}).

Lesser spotted dogfish length size ranged from 12 to 79 cm in 2010 (Figure 4). In this survey the VIIIc division showed similar sizes to the mean values of the last ten year series whereas the IXa divison showed a bit higher length abundances.

Galeus spp.

Recently a new species within the genus *Galeus*: *G. atlanticus* (Vaillant, 1888) has been described within the area (Rey *et al*, 2006; Castilho *et al*, 2007), hereby the results previously reported as *Galeus melastomus* are now merged into *Galeus* spp. Further information of the distribution between both species is presented below.

Galeus spp. represented about 6% of the total elasmobranchs stratified biomass caught and it showed an average of 4.12 Kg in the standard hauls while it was almost twice abundant in the additional hauls deeper than 500 m (8.26 Kg·haul^{-1}). The distribution of *Galeus spp.* extends from 150 to 798 m in the overall time series.

The stratified biomass of *Galeus spp.* in 2010 increased slightly in the standard hauls off Galicia (IXa division) although it had not been captured in the previous 14 years (1994-2008). *Galeus spp*. biomass in the VIIIc division remains at stable values below 1 kg·haul^{-1} since 2001, values in 2010 have decreased after the remarkable peak in 2009 driven by one haul with a big catch (115 kg) off the Asturias coast (Figure 5, Figure 6).

Catshark length sizes ranged from 13 to 70 cm in 2010 and to 73 cm in the overall time series (Figure 7). No mode is clear in 2010 results in contrast with the one found in 2009 between 26 and 30 cm.

The information about abundance and distribution of *G. atlanticus* in relation to *G. melastomus* is scarce, thus *G. atlanticus* and *G. melastomus* have been identified and recorded in the northern Spanish survey´s for the last two years. The information collected from now on (or in the future) will help to distinguish between both species and to solve the problem of splitting both species in the historical series, thus collecting temporal and spatial data is considered very important. *G. atlanticus* represented about 10% of *Galeus spp*. in 2009 and about 20% in 2010, it occurred especially in Galician waters from 266 to 697 m, while *G. melastomus* extends throughout Galician and Cantabrian shelf from 143 to 808 m. A narrower bathymetric range in *G. atlanticus* has been also reported by Rey *et al* (2010), but not enough data are available to suggest bathymetric and spatial differences on the northern Spanish Shelf.

***Etmopterus spinax* (Velvet belly)**

This species only represented about 1% of the total elasmobranchs stratified biomass caught and it showed about 60% of the total biomass of *E. spinax* in additional hauls, with an average of 1.69 Kg·haul^{-1} while about 40% was found in standards hauls (1.79 Kg haul^{-1}).

The distribution of this species extends from 230 to 704 m in the overall time series.

In the last four years, the VIIIc division showed an increasing trend of the stratified biomass of *E. spinax*, with the highest peak of the times series in 2008, but the levels in 2009 and 2010 are within the ranges of the 2000 decade (Figure 8). In the IXa division, the stratified biomass was not showed because all specimens were found in hauls deeper than 500 m (Figure 9), and thus the stratified biomass is nil.

In contrast with the wide distribution throughout the Northern Spanish Shelf of the two previous elasmobranchs analysed, *E. spinax* occurred especially in Galician waters but in deeper waters than in the Cantabrian Sea (VIIIc division).

The *E. spinax* length sizes found in the last ten surveys ranged between 8 and 44 cm. A narrower length range showed in 2010 (from 11 to 26 cm) with a mode in 16-19 cm, but abundance of different lengths was higher than in the historical series (Figure 10).

***Raja clavata* (Thornback ray)**

This species made up about 22% of the total elasmobranchs stratified biomass caught in 2010, dwelling in depths between 35 and 697 m in the overall time series.

In 2010, the IXa division showed the highest peak of biomass of *R. clavata* of the time series, as many as 129.5 times more abundant in the standard hauls than in 2009. However, in the VIIIc division, the biomass was slightly lower than 2009, but it was within of the large amounts of the last ten years (Figure 11).

R. clavata distributed in offshore and shallow water, only about 3% of the occurrences were caught deeper than 300 m in the last ten years (Figure 12).

Thornback ray individuals caught in 2010 ranged from 14 to 90 cm (Figure 13).

***Raja montagui* (Spotted ray)**

R. montagui represented about 22% of the total elasmobranchs stratified biomass caught in 2010. The depth distribution of this species extends from 35 to 564 m throughout the time series, although no record was found from 240 to 550 m and just two deeper than 550 m. *R. montagui* does not seem to distribute as deep as *R. clavata* in the Cantabrian Sea.

In the last three years, the VIIIc division showed an increasing trend of the biomass after the low biomass in 2008, but otherwise it remains stable after the peak at the beginning of the decade (Figure 14). No record of *R. montagui* was found in the IXa division, neither in the standard nor in the additional hauls in the overall time series (Figure 15).

Spotted ray length size ranged from 28 to 84 cm in 2010 (Figure 16).

***Leucoraja naevus* (cuckoo ray)**

This species represented about 3% of the elasmobranchs total stratified biomass caught, with a depth range from 35 to 590 m in the overall time series.

In 2010 the VIIIc division showed a slight decrease in the biomass of *L. naevus*, but no clear trend was found in the last ten years (Figure 17). Like *R. montagui*, *L. naevus* was not found in IXa division, (Figure 18).

Cuckoo ray length distribution ranged from 20 to 65 cm in 2010 (Figure 19).

Acknowledgements

We would like to thank R/V *Cornide de Saavedra* crews and the scientific teams from IEO that made possible SPNGF Surveys.

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Figures

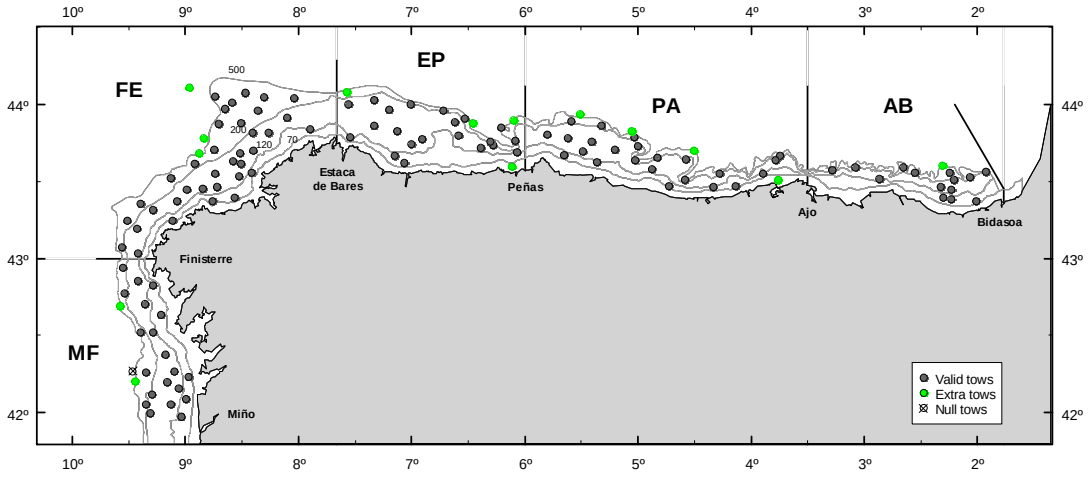

Figure 1 Stratification design and hauls on the Northern Spanish Shelf Groundfish survey in 2010; depth strata are: A) 70-120 m, B) 121 – 200 m and C) 200 – 500 m. Geographic surveys are MF: Miño-Finisterre, FE: Finisterre-Estaca, EP: Estaca-cabo Peñas, PA: Peñas-cabo Ajo, and AB: Ajo-Bidasoa.

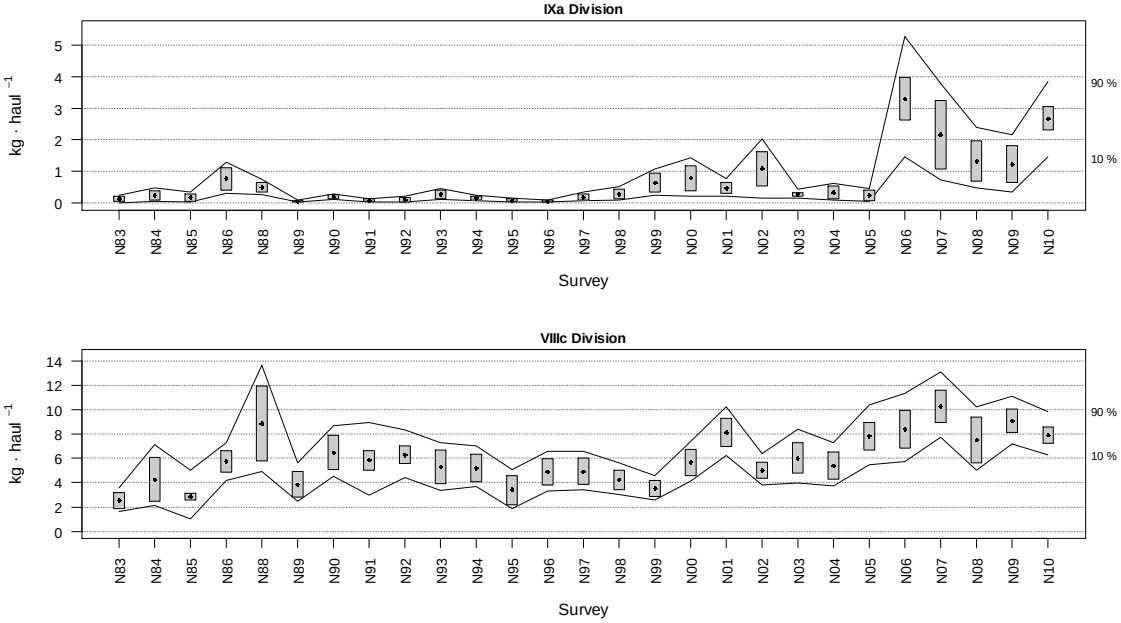

Figure 2 Changes in *Scyliorhinus canicula* biomass index during the North Spanish shelf bottom trawl survey time series (1983-2010 but in 1987) in the two ICES divisions covered by the survey. Boxes mark parametric standard error of the stratified biomass index. Lines mark bootstrap confidence intervals (α= 0.80, bootstrap iterations = 1000)

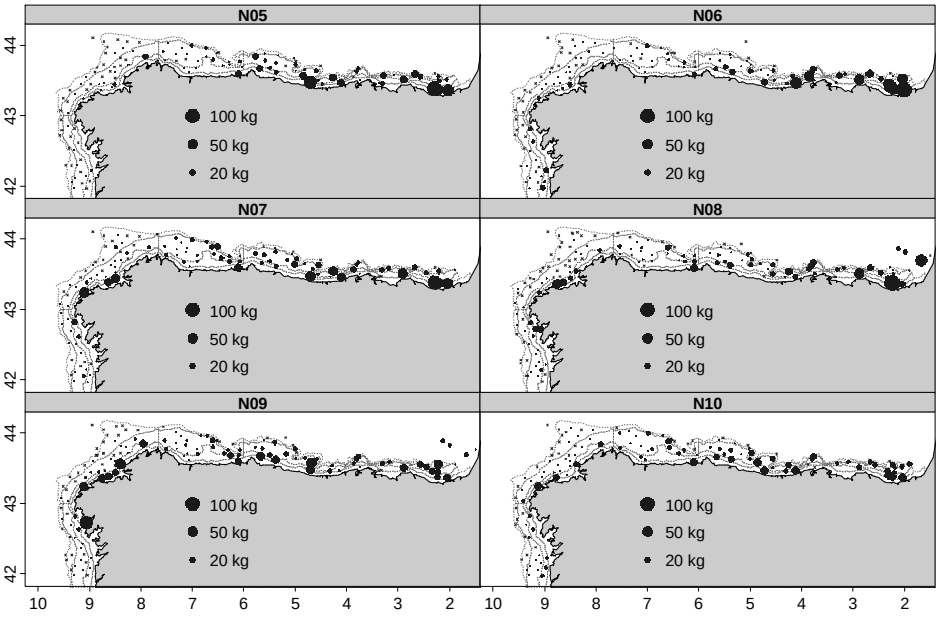

Figure 3 Geographic distribution of *Scyliorhinus canicula* catches (kg/30 min haul) in North Spanish Shelf bottom trawl surveys between 2005 and 2010

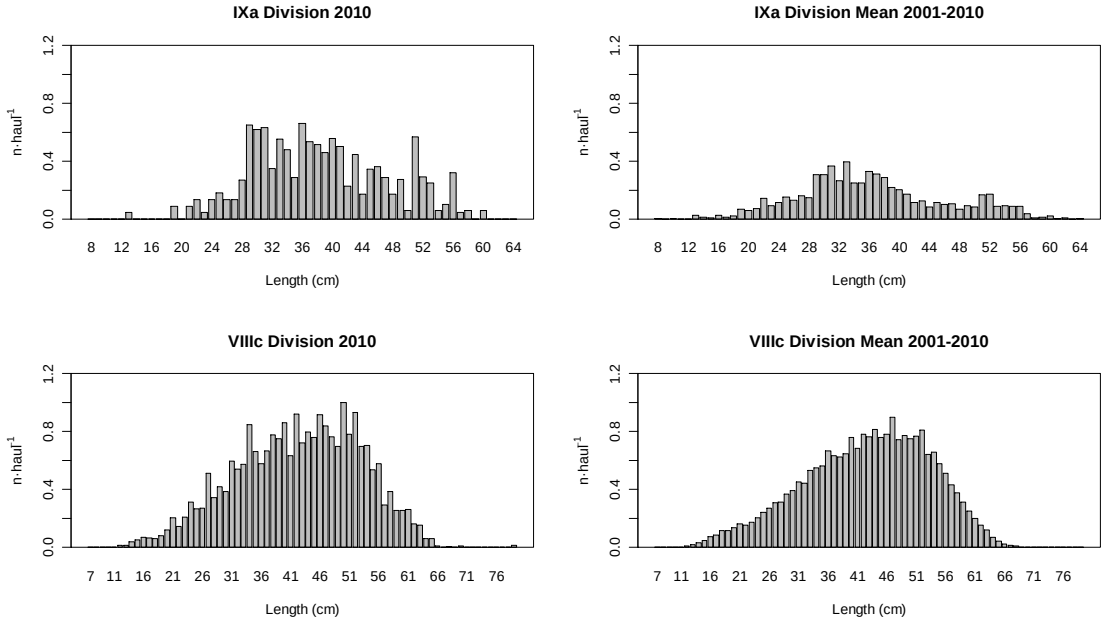

Figure 4 Stratified length distributions of *Scyliorhinus canicula* in 2010 in the two ICES divisions covered by the North Spanish Shelf bottom trawl survey, and Mean values for the last decade in both areas (2001-2010)

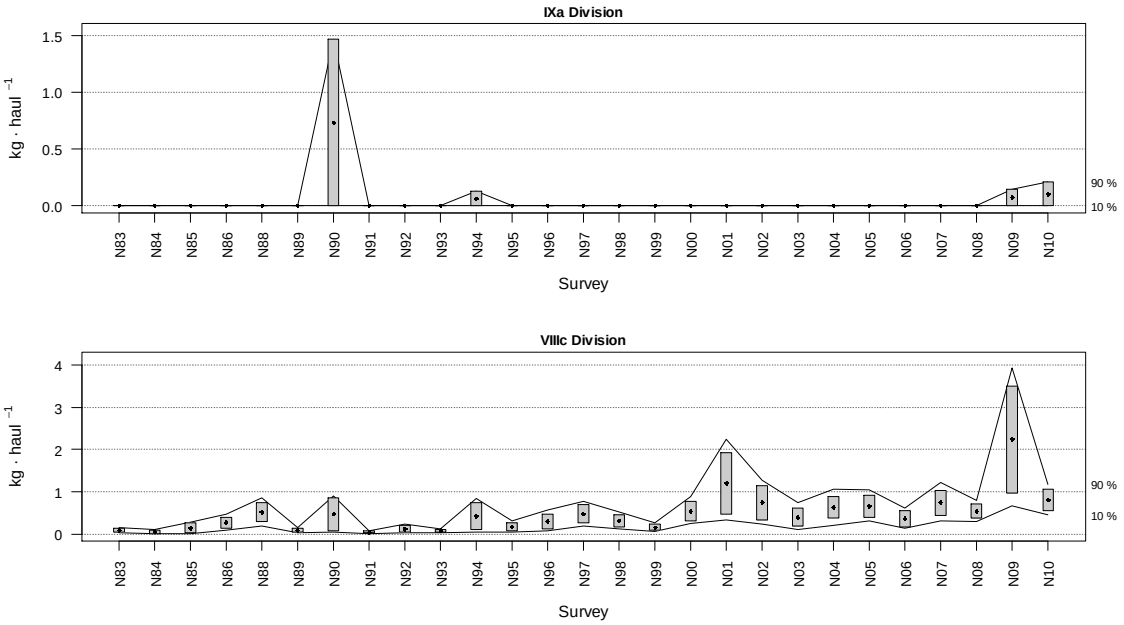

Figure 5. Changes in *Galeus spp.* biomass index during the North Spanish shelf bottom trawl survey time series (1983-2010 but in 1987) in the two ICES divisions covered by the survey. Boxes mark parametric standard error of the stratified biomass index. Lines mark bootstrap confidence intervals (α= 0.80, bootstrap iterations = 1000)

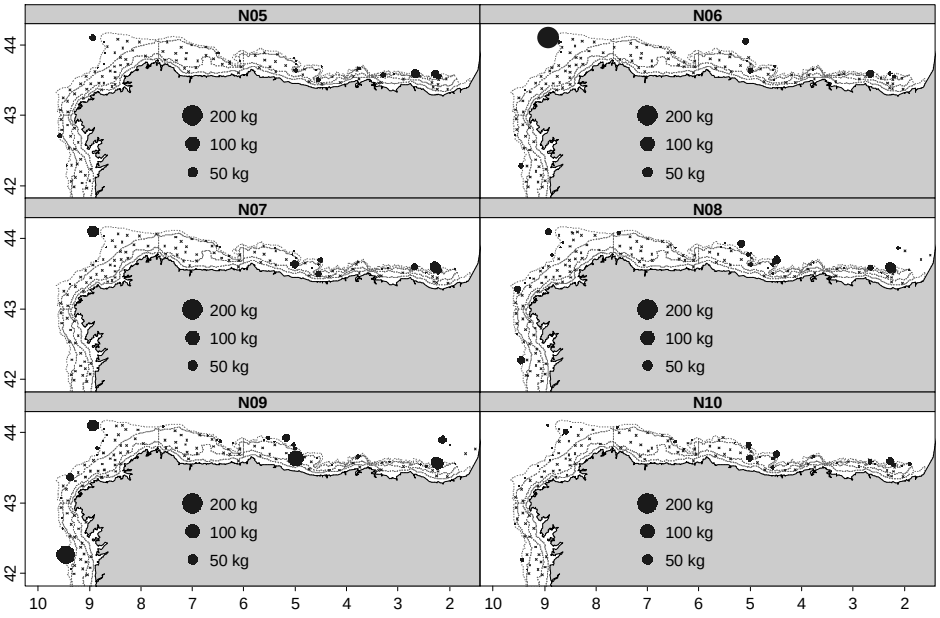

Figure 6 Geographic distribution of *Galeus spp.* catches (kg/30 min haul) in North Spanish Shelf bottom trawl surveys between 2005 and 2010

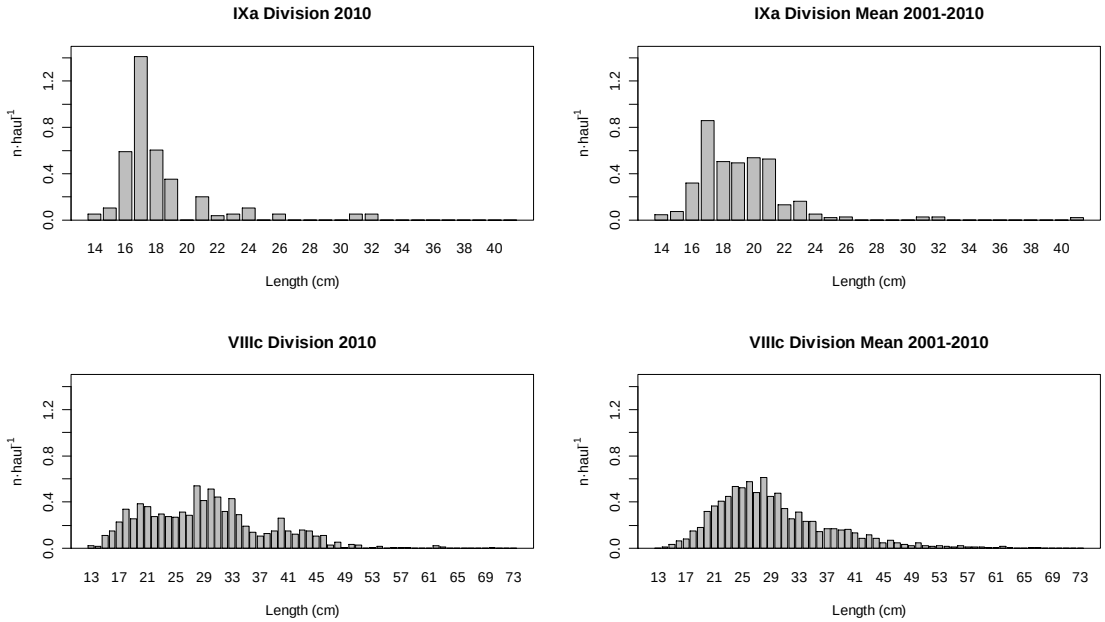

Figure 7 Mean stratified length distributions of *Galeus spp.* in the North Spanish Shelf surveys (2001-2010)

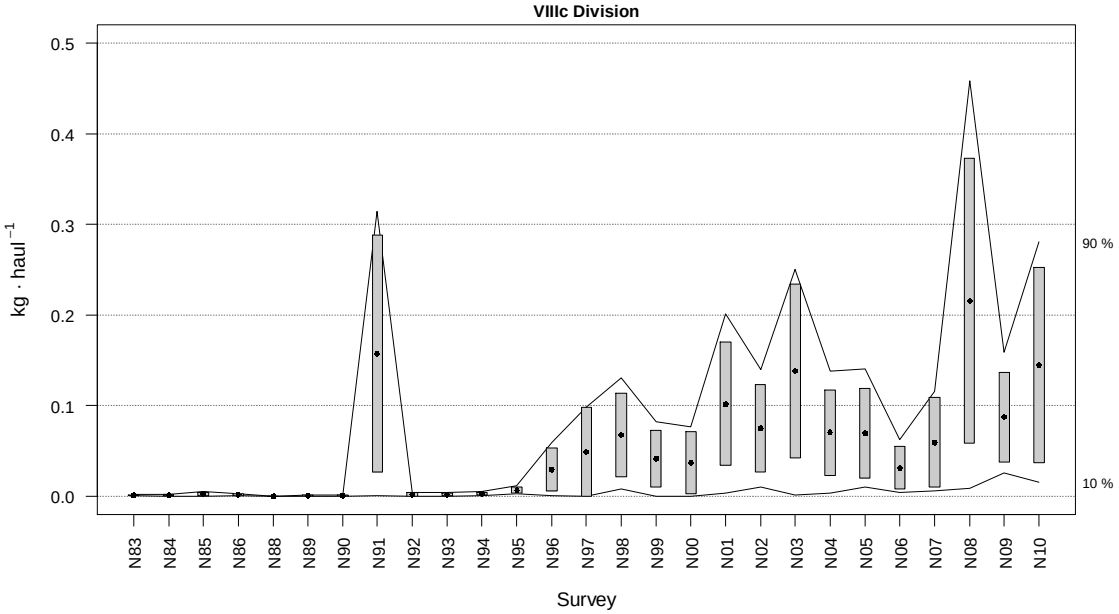

Figure 8 Changes in *Etmopterus spinax* biomass index during the North Spanish shelf bottom trawl survey time series (1983-2010 but in 1987) in the VIIIc division covered by the survey. Boxes mark parametric standard error of the stratified biomass index. Lines mark bootstrap confidence intervals (α= 0.80, bootstrap iterations = 1000)

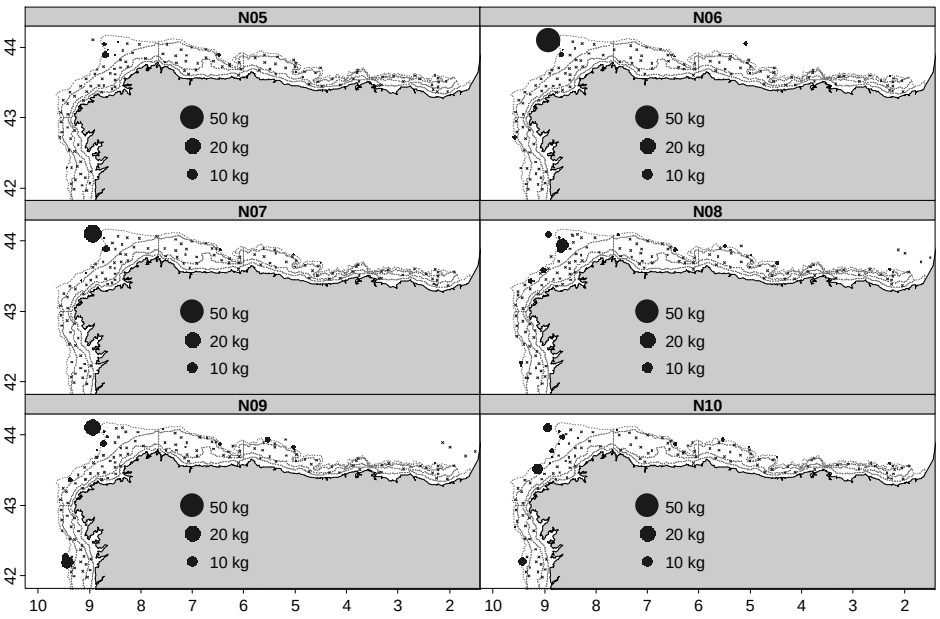

Figure 9 Geographic distribution of *Etmopterus spinax* catches (kg/30 min haul) in North Spanish Shelf bottom trawl surveys between 2005 and 2010

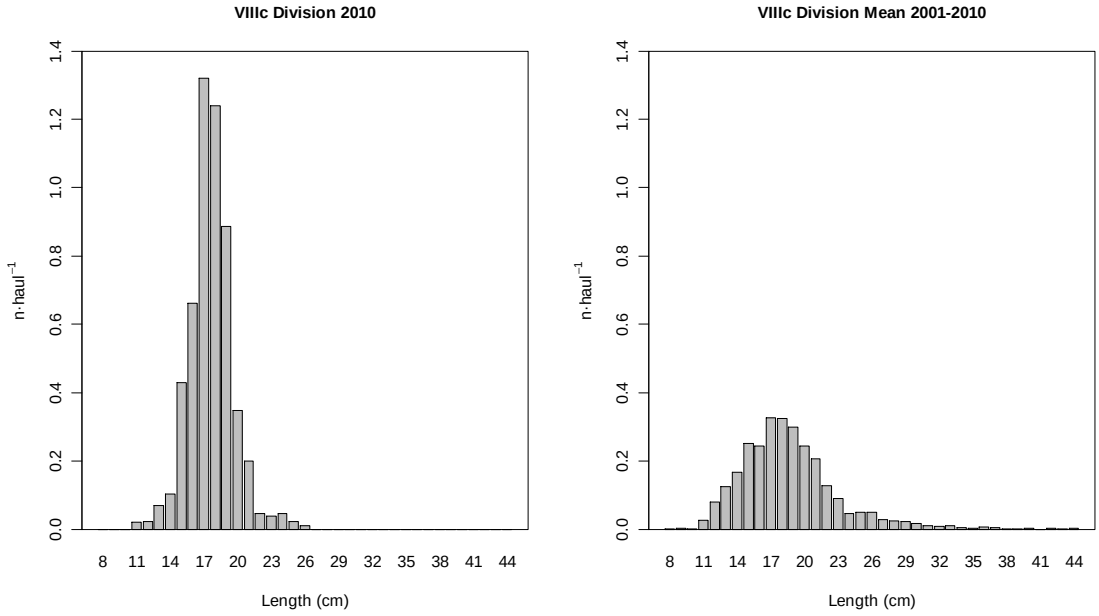

Figure 10 Mean stratified length distributions of *Etmopterus spinax* in the North Spanish Shelf surveys (2001-2010)

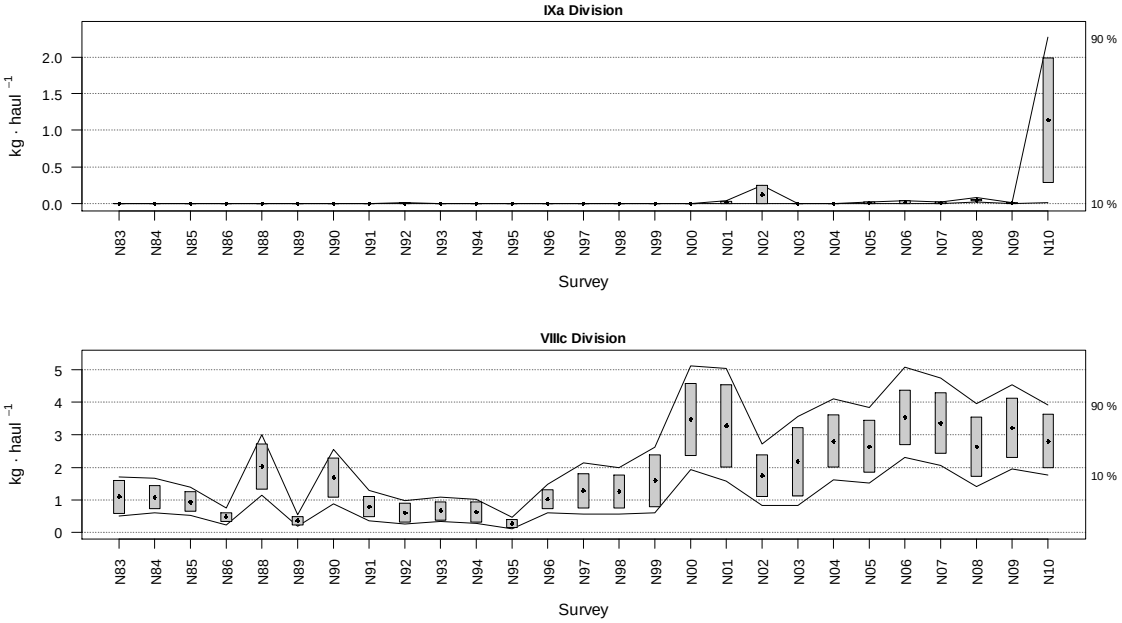

Figure 11. Changes in *Raja clavata* biomass index during the North Spanish shelf bottom trawl survey time series (1983-2010 but in 1987) in the two ICES divisions covered by the survey. Boxes mark parametric standard error of the stratified biomass index. Lines mark bootstrap confidence intervals (α= 0.80, bootstrap iterations = 1000)

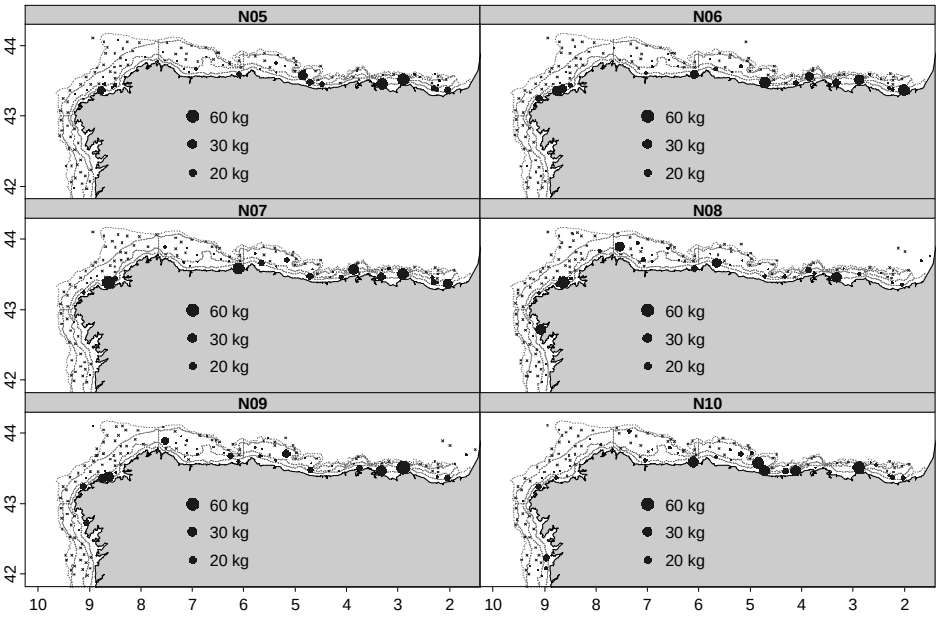

Figure 12. Geographic distribution of *Raja clavata* catches (kg/30 min haul) in North Spanish Shelf bottom trawl surveys between 2005 and 2010

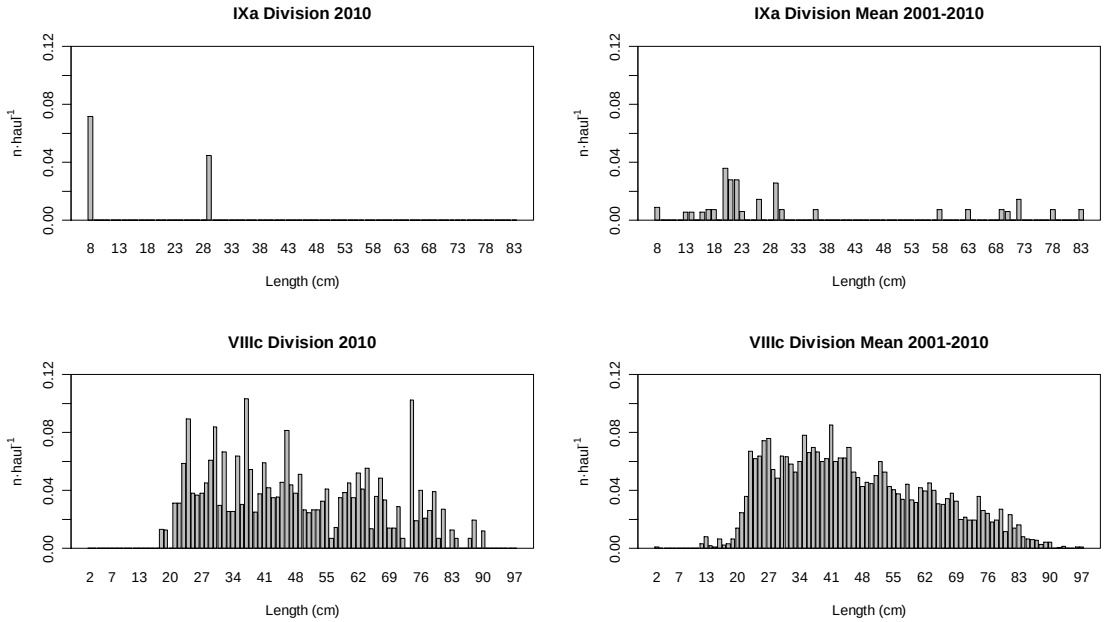

Figure 13. Mean stratified length distributions of *Raja clavata* in the North Spanish Shelf surveys (2001-2010)

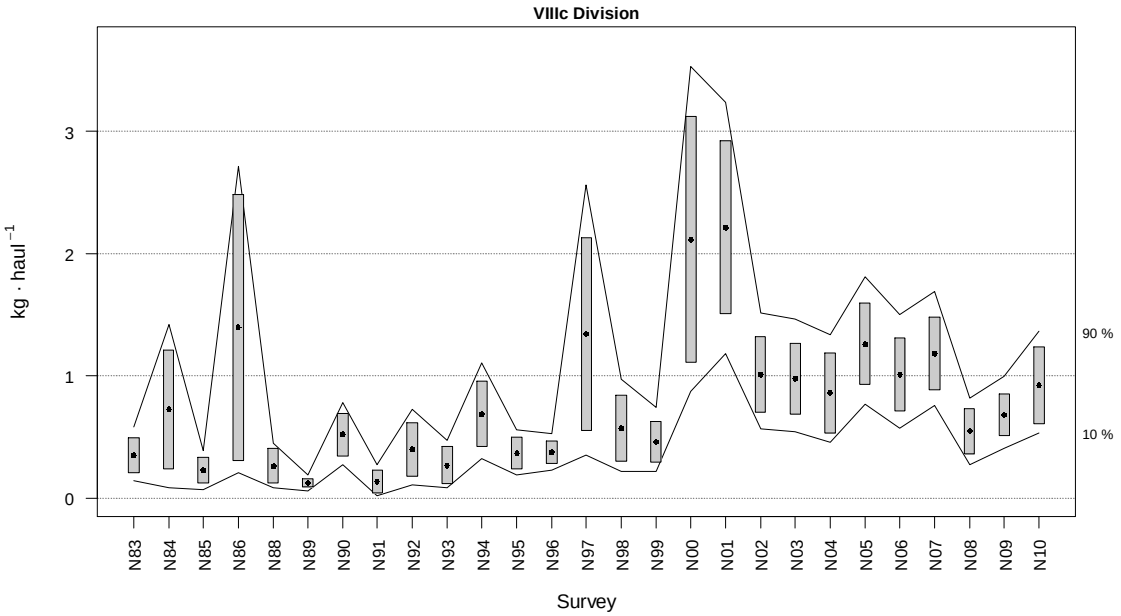

Figure 14. Changes in *Raja montagui* biomass index during the North Spanish shelf bottom trawl survey time series (1983-2010 but in 1987) in the VIIIc division covered by the survey. Boxes mark parametric standard error of the stratified biomass index. Lines mark bootstrap confidence intervals (α= 0.80, bootstrap iterations = 1000)

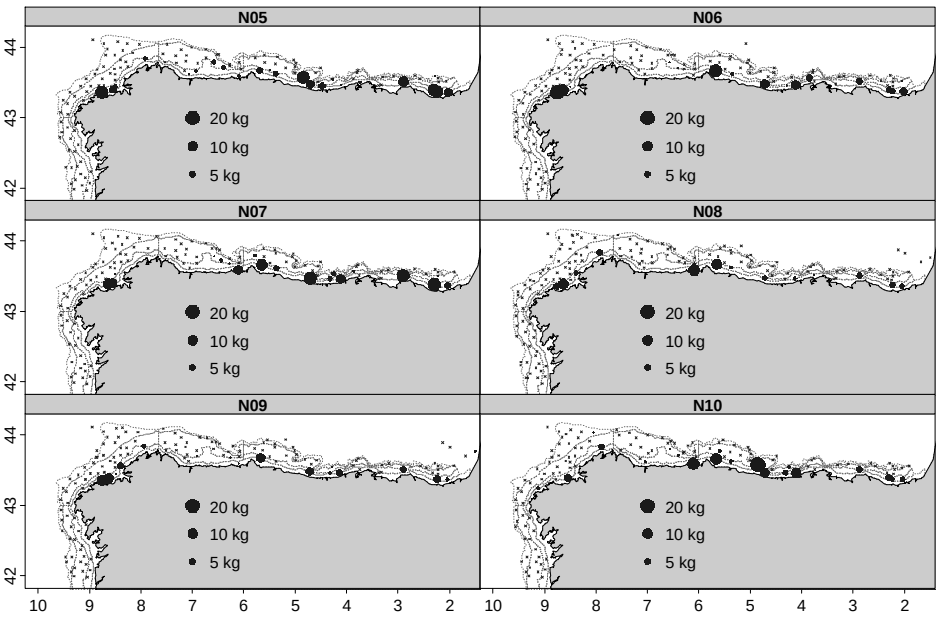

Figure 15. Geographic distribution of *Raja montagui* catches (kg/30 min haul) in North Spanish Shelf bottom trawl surveys between 2005 and 2010

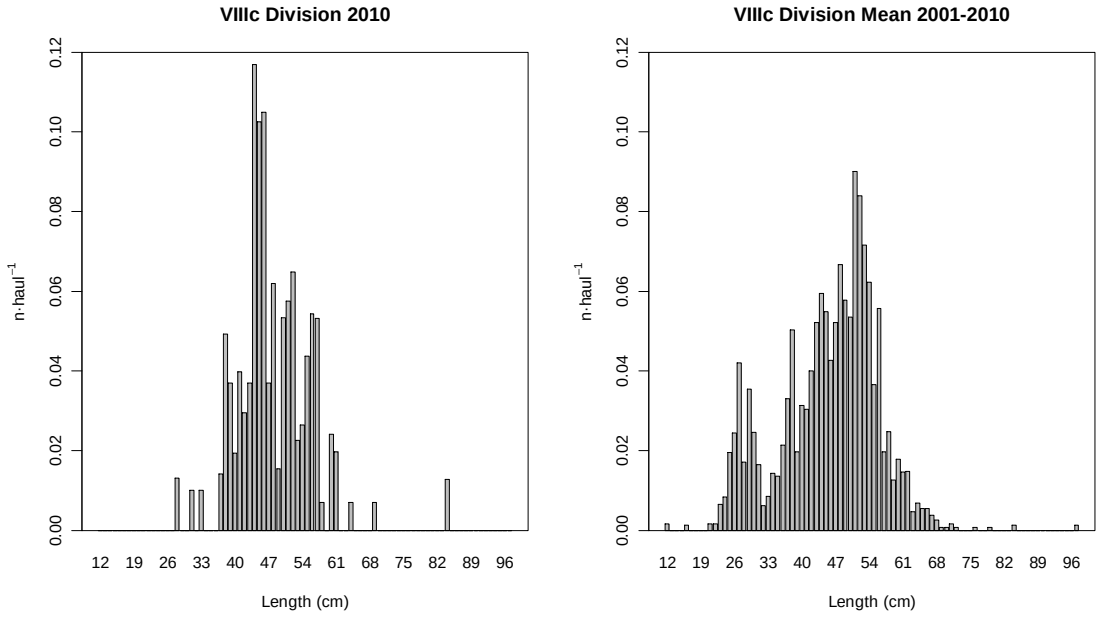

Figure 16. Mean stratified length distributions of *Raja montagui* in the North Spanish Shelf surveys (2001-2010)

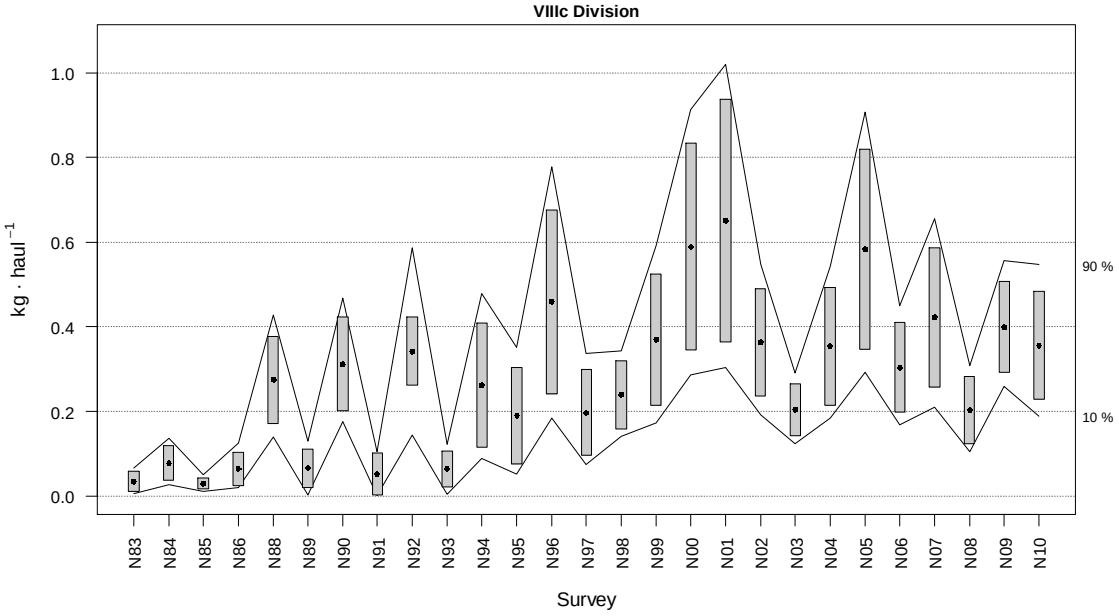

Figure 17. Changes in *Leucoraja naevus* biomass index during the North Spanish shelf bottom trawl survey time series (1983-2010 but in 1987) in the VIIIc division covered by the survey. Boxes mark parametric standard error of the stratified biomass index. Lines mark bootstrap confidence intervals (α= 0.80, bootstrap iterations = 1000)

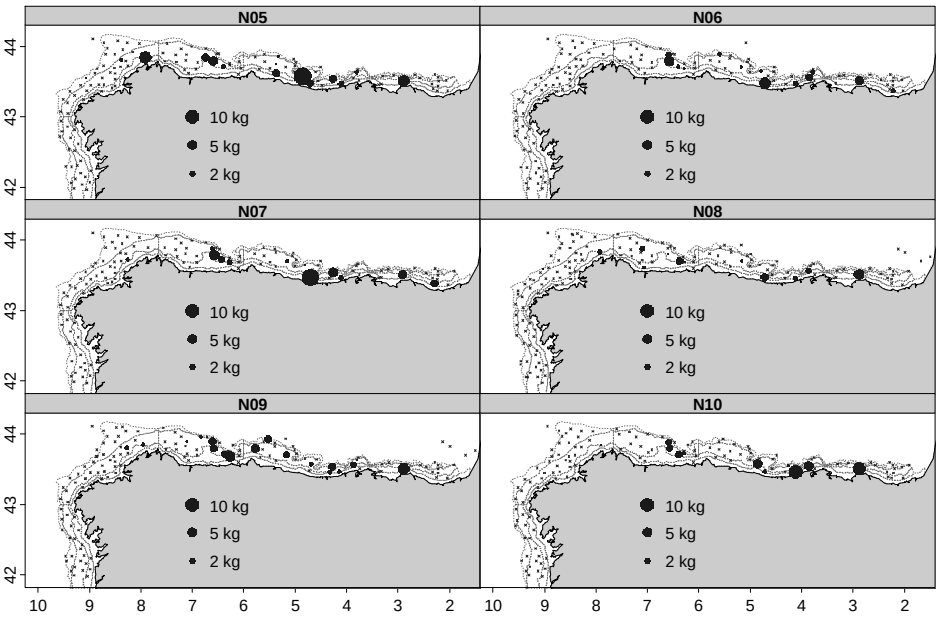

Figure 18 Geographic distribution of *Leucoraja naevus* catches (kg/30 min haul) in North Spanish Shelf bottom trawl surveys between 2005 and 2010

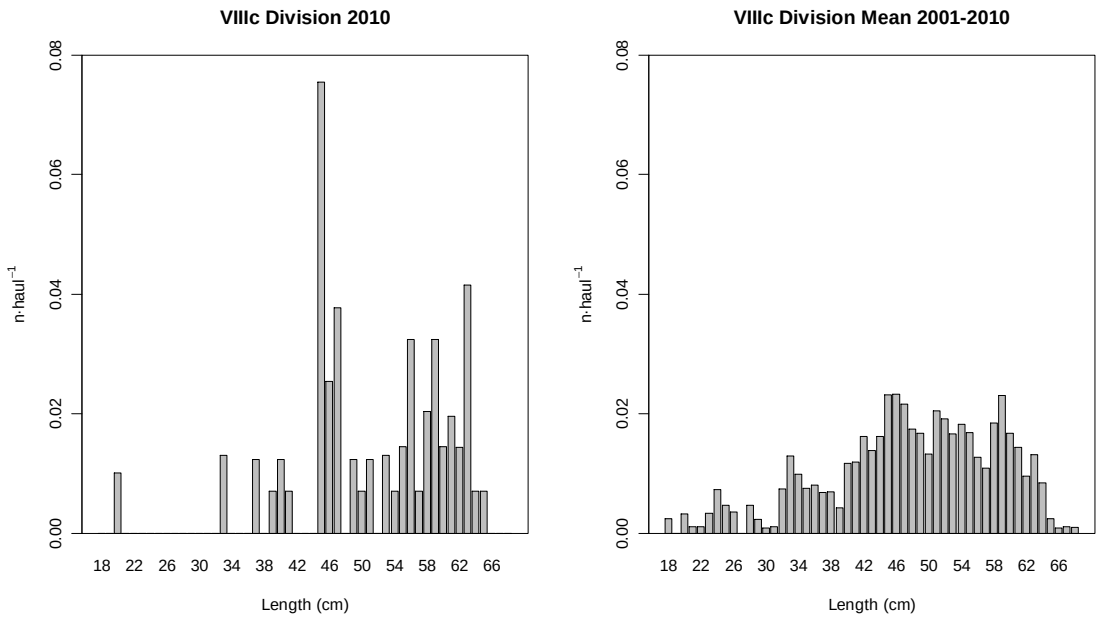

Figure 19 Mean stratified length distributions of *Leucoraja naevus* in the North Spanish Shelf surveys (2001-2010)